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## FORESTS AND GRASS HELP TO HOLD THE SOIL AT HOME

A radio talk by Dr. R. S. Campbell, Senior Forest Ecologist, Forest Service, delivered during the Department period of the Conservation Day program of the National Farm and Home Hour, Friday, September 13, 1935, and broadcast by NBC and a network of 60 associated radio stations.

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Nature created forests, spacing them strategically on watersheds throughout the United States, where they serve, in part, as huge simulated sponges for absorbing rainfall and maintaining the soil water supply. Similarly, nature mantled mountain slopes and hillsides, valleys and plains with grass and other herbaceous vegetation, which aids in the eventual percolation of precipitation into the soil. Vegetation produces litter and conserves moisture by checking evaporation, intercepting rainfall, and retarding snow melt. This combination of beneficial influences prevents destructive erosion and regulates streamflow.

Without trees, shrubs, grass, and allied cover as deterrents, precipitation forms ever-growing rivulets and rivers which rush to the sea from their sources on exploited watersheds, leaving calamity behind. In South Carolina, for example, the flood damage has amounted to nearly \$1,000,000 annually for 20 years. There have been serious floods in nearly every section of the country this year.

It is perfectly normal for some erosion to occur. Fortunately, even a light vegetative covering, if undisturbed, will ordinarily hold normal erosion to a negligible amount. Disturb that cover and trouble brews, ultimately causing abnormal erosion, which robs forest and range lands of their fertile top soil, loads streams and reservoirs with silt, and increases the destructiveness of floods. More than one-half of the United States is forest and range--important as watershed lands. That is why the satisfactory restoration and maintenance of forest and range cover on watersheds is of critical concern to every citizen. The National Forests were established mainly on important watershed lands, and the United States Forest Service seeks to properly regulate the lumbering and grazing, and control fires.

The importance of this problem has caused the U.S. Department of Agriculture to establish, among its bureaus, a coordinated program of erosion-streamflow research.

The United States Forest Service is studying watershed conservation on forest and range lands. Our research is conducted by twelve regional forest or forest and range experiment stations throughout the country. It includes studies of forest and range management as well as investigations of the influence of forest and range vegetation upon erosion and streamflow.

Our results have shown how forest litter absorbs rainfall and regulates water percolation. For example, in the Ohio Valley, we found that forest soil at a one-inch depth, absorbs water 50 times as fast as field soil;

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at a 3-inch depth, nearly 15 times as fast.

Even thin litter in such regions of light rainfall as the chaparral and conifer types in California will absorb 1.8 times its weight in water. New England spruce-hardwood litter several inches thick will absorb up to 9 times its dry weight.

Forests intercept much precipitation. A good pulpwood stand of spruce-fir in Maine was found to intercept 37 percent of the rainfall. Tops of virgin ponderosa pine in Idaho have even intercepted 27 percent of the annual snowfall.

Perennial grasses on the range are very effective in holding the soil in place. In Idaho, using a machine for simulating rain, we compared erosion and runoff from a good bunchgrass type with that from an annual weed type. We found that an artificial rain of about 2 inches resulted in run-off of 24 percent from the bunchgrass type and 66 percent or three times as much from the annual weed type. Approximately 2 1/2 tons of soil per acre washed from the bunchgrass, but 13 tons or over 5 times as much from the annual weed type during that artificial storm.

Severe overgrazing often causes acute watershed situations. According to geologic evidence, floods from the Wasatch Mountains in Utah in recent years exceed any during the last 20,000 years or more. Serious depletion of the vegetation, through overgrazing, allowed rapid accumulation of water on critical parts of the watersheds. The rainfall, instead of percolating into the plant and soil mantle as it originally did, rushed off the slopes, eroding soil, gouging out stream channels, and producing floods devastating to life and property. Under our supervision, the Civilian Conservation Corps has constructed terrace-trenches and planted grass and trees on the comparatively small but critical depleted areas where the floods originated. These measures were calculated to hold the water from rains and allow it to go into the soil.

In central Utah, our studies show that where range lands have been seriously depleted, artificial reseeding may be an important help in restoring a suitable cover for forage and watershed protection.

Fire is one of the most common destructive agents affecting vegetative cover. In southern California, the dense brush and forest cover on steep mountain slopes, unless destroyed by fire, prevents abnormal erosion. In November, 1933, 5,000 acres of brush burned over about La Crescenta, near Los Angeles. About a month later 12 inches of rain fell on the already saturated mountain slopes, resulting in a great flood and causing a loss of 200 homes and 34 lives. The maximum run-off rate was 20 times greater and the erosion was a thousand times greater from the burned watershed than from the neighboring well-vegetated San Dimas watershed, where we are conducting intensive erosion-streamflow research. Twenty years of study have shown watershed management to be extremely complicated. Realizing this, the Forest Service will continue its quest for research results which will bring about the proper management and use of forest and range lands.